

WHAT IS CLAIMED IS:

1 1. A method for drilling a wellbore having a fluid circuit whereby a drilling
2 fluid is supplied to a drill bit and the drilling fluid with entrained cuttings (the
3 "return fluid") is returned from the drill bit to a surface location, the method
4 comprising:

5 (a) positioning a fluid circulation device in the return fluid, the fluid
6 circulation device providing the primary motive force for flowing the return fluid
7 from the drill bit to the surface location.

1 2. The method according to claim (1) wherein the fluid circuit includes a
2 supply line and a return line, and further comprising:

3 (a) supplying drilling fluid to the drilling assembly via the supply line; and

4 (b) returning the return fluid to the surface location via the return line.

1 3. The method according to claim (2) wherein the supply line includes at
2 least an annulus of the wellbore.

1 4. The method according to claim (2) wherein the return line includes one of
2 (i) drill string, (ii) a coiled tubing, (iii) a casing, (iv) a liner, and (iv) a tubular
3 member.

1 5. The method according to claim (1) wherein the fluid circulation device is
2 selected from one of (a) a positive displacement pump, (b) a centrifugal type
3 pump, (c) a Moineau-type pump, and (d) a jet pump.

1 6. The method according to claim (1) further comprising driving the fluid
2 circulation device with a drive assembly selected from one of (a) a positive
3 displacement drive, (b) a turbine drive, (c) an electric motor, (d) a hydraulic
4 motor, and (e) a Moineau-type motor.

- 1 7. The method according to claim (1) further comprising reducing the size of
2 cuttings entrained in the return fluid with a comminution device.
- 1 8. The method according to claim (2) further comprising positioning a pump
2 in the supply line to providing a supplemental motive force for circulating the
3 drilling fluid.
- 1 9. The method according to claim (8) wherein the supply line includes at
2 least an annulus of the wellbore.
- 1 10. The method according to claim (1) further comprising energizing the fluid
2 circulation device with one of (i) a fuel cell; (ii) hydraulic fluid; (iii) geothermal
3 power; (iv) surface supplied electrical power; and (v) compressed gas.
- 1 11. The method according to claim (1) further comprising rotating the drill bit
2 rotated by a motor that is operated by one of (i) a fuel cell; (ii) hydraulic fluid; (iii)
3 geothermal power; and (iv) surface supplied electrical power.
- 1 12. The method according to claim (1) further comprising rotating the drill bit
2 and driving the fluid circulation device with a same motor.
- 1 13. The method according to claim (1) further comprising providing a localized
2 flow rate proximate to the drill bit that is functionally effective to wash the drill bit
3 of cuttings.
- 1 14. The method according to claim (1) wherein the drilling assembly includes
2 a drill bit, and further comprising: rotating the drill bit with a drill string at least
3 partially formed of a liner.
- 1 15. The method according to claim (1) wherein the surface location is an
2 offshore platform.

1 16. The method according to claim (1) further comprising positioning a
2 secondary fluid circulation device in serial alignment with the fluid circulation
3 device, the fluid circulation device and the secondary fluid circulation device
4 cooperating to provide the primary motive force for flowing the return fluid from
5 the drill bit to the surface location.

1 17. The method according to claim (1) further comprising operating the fluid
2 circulation device substantially independent of drill bit rotation.

1 18. A system for drilling a wellbore, comprising:

2 (a) a fluid circuit for supplying a drilling fluid to a drill bit and returning
3 the drilling fluid with entrained cuttings (the "return fluid") from the drill bit to the
4 surface; and

5 (b) a fluid circulation device in the return fluid, said fluid circulation
6 device providing the primary motive force for flowing the return fluid to the
7 surface.

1 19. The system according to claim (18) wherein said fluid circuit includes a
2 supply line for conveying drilling fluid to said drill bit and a return line for returning
3 the return fluid to the surface

1 20. The system according to claim (19) wherein said supply line comprises at
2 least an annulus of the wellbore.

1 21. The system according to claim (19) wherein said return line comprises
2 one of (i) drill string, (ii) a coiled tubing, (iii) a casing, (iv) a liner, and (iv) a tubular
3 member.

1 22. The system according to claim (18) wherein said fluid circulation device is
2 selected from one of (a) a positive displacement pump, (b) a centrifugal type
3 pump, (c) a jet pump, and (d) a Moineau-type pump.

1 23. The system according to claim (18) wherein said fluid circulation device is
2 driven by one of (a) a positive displacement drive, (b) a turbine drive, (c) a
3 electric motor, (d) a hydraulic motor, and (e) a Moineau-type motor.

1 24. The system according to claim (18) further comprising a comminution
2 device for reducing the size of cuttings entrained in the return fluid.

1 25. The system according to claim (19) further comprising a pump positioned
2 in said supply line to provide a supplemental motive force for flowing the drilling
3 fluid.

1 26. The system according to claim (25) wherein the supply line includes at
2 least an annulus of the wellbore.

1 27. The system according to claim (18) wherein said fluid circulation device is
2 driven by a drive assembly energized by one of (i) a fuel cell; (ii) hydraulic fluid;
3 (iii) geothermal power; (iv) surface supplied hydraulic fluid; and (v) surface
4 supplied electrical power.

1 28. The system according to claim (18) further comprising a motor coupled to
2 the drill bit, said motor being operated by one of (i) a fuel cell; (ii) hydraulic fluid;
3 (iii) geothermal power; (iv) surface supplied hydraulic fluid; (v) surface supplied
4 electrical power, and (vi) compressed gas.

1 29. The system according to claim (18) wherein said drill bit is rotated by one
2 of: (i) a drill string at least partially formed of a liner, and (ii) a motor for driving
3 said fluid circulation device

1 30. The system according to claim (19) further comprising:
2 (a) a variable volume tank positioned proximate to a seabed floor, said
3 tank supplying drilling fluid into said supply line; and

4 (b) an offshore platform adapted to receive the return fluid flowing through
5 said return line.

1 31. The system according to claim (18) further comprising a secondary fluid
2 circulation device in serial alignment with said fluid circulation device, said fluid
3 circulation device and said secondary fluid circulation device cooperating to
4 provide the primary motive force for flowing the return fluid from the drill bit to the
5 surface location.

1 32. The system according to claim (18) further comprising an near bit fluid
2 circulation device positioned proximate to said drill bit, said near bit fluid
3 circulation device adapted to provide a localized flow rate functionally effective
4 for cleaning the drill bit of cuttings.

1 33. The system according to claim (18) wherein said fluid circulation device is
2 configured to operate independently of drill bit rotation.